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Electric motor with radial flux

Vishnu Kumar Patel

Assistant Professor

Department of Electrical Engineering

Shri Krishna University, Chhatarpur (MP)

ABSTRACT

In the present market, companies are looking for ways to improve the efficiency and economy of their systems. As a result, they are looking for ways to make their system more efficient as well as the best electric motor to use in their application. When searching for the ideal electric motor, one common question is whether to choose an axial flux or radial flux electric motor. At Magnetic Innovations, we are strong proponents of radial flux permanent magnet motor topology. This article will explain why.

SUMMARY

a radial flux conventional BLDC motor with an internal permanent magnet rotor the stator. The stator contains support known as a yoke, which is outfitted with "teeth", individually wrapped with electromagnetic coils. The teeth function as alternating magnetic poles.

CONSTRUCTION

As an example, traditional radial flux BLDC motors consist of a rotor made of permanent magnets located inside a stator. In this case: A stator contains support known as a yoke, which is outfitted with "teeth" containing electromagnetic coils. The teeth function as alternating magnetic poles. The rotor's magnetic poles interact with the alternating magnetic flux of the wound stator teeth, resulting in the motor's torque.



Fig.-1 Radial flux motor construction

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A comparison table of this type of motor and radial flux motor is presented

Motor	Weight	Torque density
Radial flux motor	50kg	400Nm
Axial flux motor	24-25 kg	800Nm

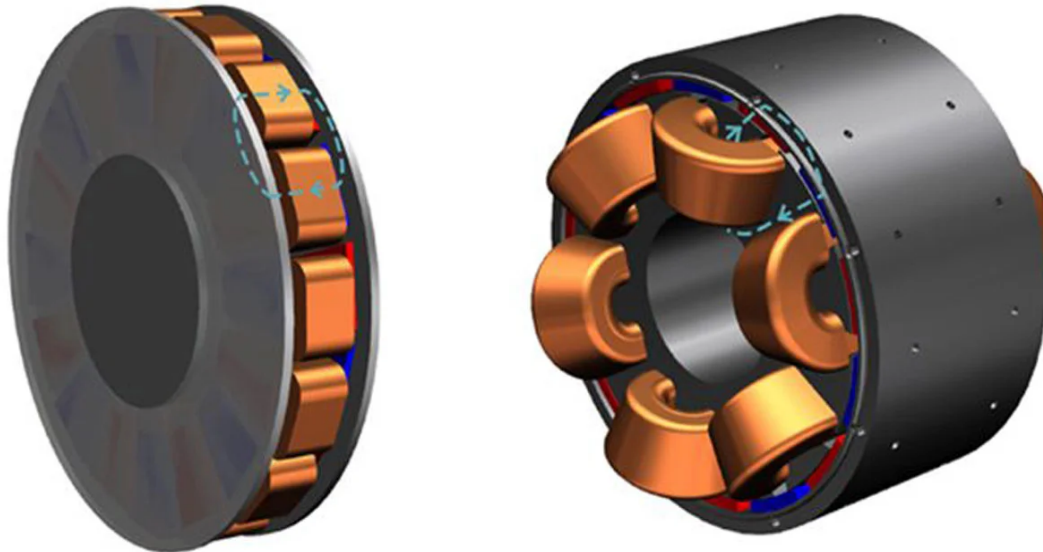
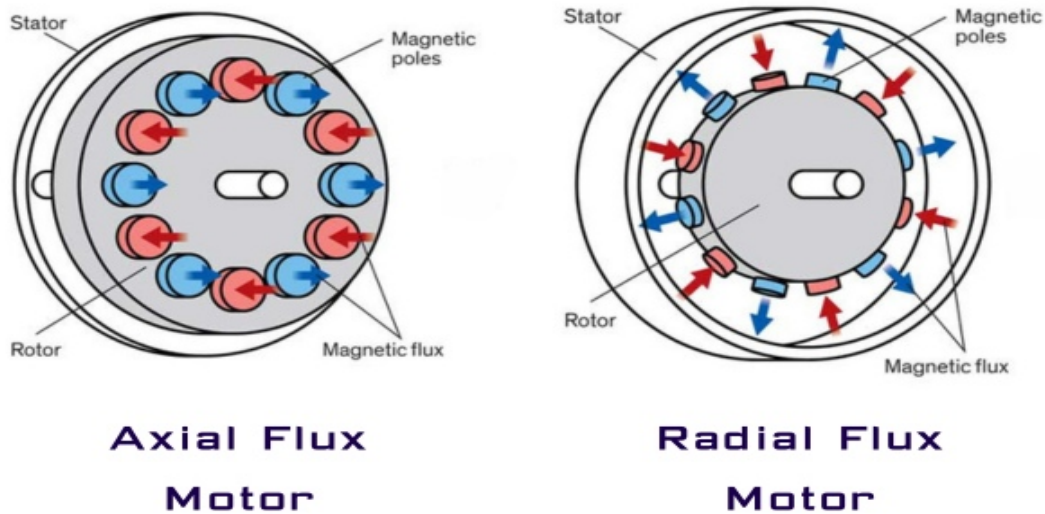


Fig.-2 radial flux motor

Characteristic	Axial Flux Motor	Radial Flux Motor
Magnetic Flux Path	Parallel to Axis of Rotation	Radial, from Center to Edge
Motor Thickness	Thin and Flat (Pancake Shape)	Thicker, Cylindrical
Rotor-Stator Configuration	Coaxial Discs (Parallel)	Cylinders
Efficiency	Typically Higher	Variable, Depending on Design
Cooling	More Effective Due to Flat Design	Cooling More Challenging
Size and Weight	Compact and Lightweight	Bulkier and Heavier
Applications	Robotics, Some Wind Turbines	Generators, Industrial Drives, Appliances
Noise Level	Generally Lower Noise Emission	Variable, Dependent on Design



RADIAL FLUX MOTOR ADVANTAGES

The radial flux motors has a significantly reduced volume of permanent magnets in comparison to Axial flux motors and are therefore more sustainable. They are also easier to install and they are cheaper.

RADIAL FLUX MOTOR DISADVANTAGES

While radial flux motor is widely used and well-established, they typically exhibit lower power density and efficiency compared to axial flux motor in certain applications due to their design limitations.

APPLICATIONS OF RADIAL FLUX MOTOR

Radial flux motors are extensively used in numerous applications, owing to their high power density and cost-effectiveness. These applications range from home appliances such as washing machines and fans to electric vehicles and industrial machinery. In fact, most electric vehicles on the road today use radial flux motors due to their high torque capabilities and efficiency.

CHALLENGES AND FUTURE PROSPECTS

Despite the numerous advantages, radial flux motors are not without their challenges. The primary hurdle pertains to heat management. Given that the windings and core are located close to each other, excess heat produced can be problematic. Moreover, the radial configuration necessitates a strong supporting structure to withstand the forces during operation, adding to the motor's weight and size.

CONCLUSION

In conclusion, the comparison between axial flux and radial flux motors highlights the importance of understanding their distinct characteristics and applications. While axial flux motors offer advantages such as higher power density and efficiency, radial flux motors excel in simplicity and cost-effectiveness.

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